

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
10 May 2002 (10.05.2002)

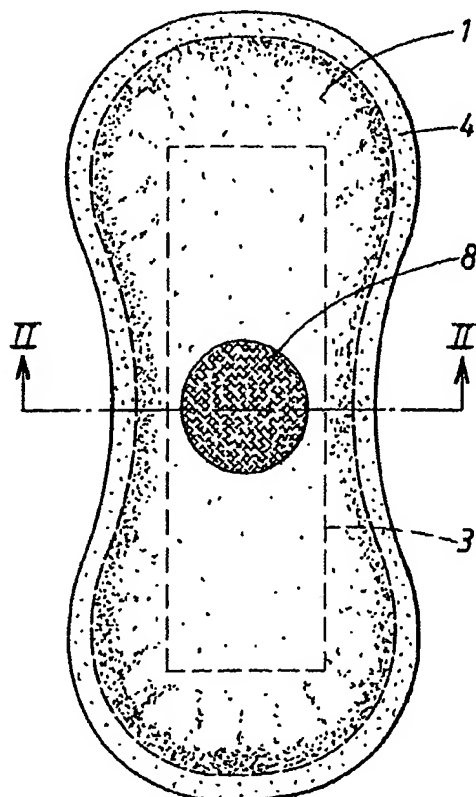
PCT

(10) International Publication Number  
**WO 02/36057 A1**

- (51) International Patent Classification<sup>7</sup>: **A61F 13/51**
- (21) International Application Number: **PCT/SE01/02228**
- (22) International Filing Date: 15 October 2001 (15.10.2001)
- (25) Filing Language: Swedish
- (26) Publication Language: English
- (30) Priority Data:  
0004016-2 2 November 2000 (02.11.2000) SE
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- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:  
— with international search report

[Continued on next page]

(54) Title: **ELASTIC ABSORBENT ARTICLE**



(57) Abstract: The present invention relates to an elastic absorbent article such as a sanitary towel, a panty liner or an incontinence pad. The invention is characterized in that the inner layer (1) and the outer layer (2) are elastic and in that the intermediate absorption body (3) is non-elastic, in that the absorption body (3) is connected to at least one of the said inner and outer layers only in a central and tiny region and in that the said region (4) is visibly marked on the liquid-permeable inner layer (1).

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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## ELASTIC ABSORBENT ARTICLE

The present invention relates to an elastic absorbent article such as a sanitary towel, a panty liner or an incontinence pad, intended to be placed in the crotch region of an undergarment, which article has a longitudinal direction and a transverse direction and comprises a liquid-permeable inner layer and a liquid-impermeable outer layer and an absorption body enclosed between the said layers, in addition to which the article incorporates fastening means for securing the article in the undergarment.

10

## BACKGROUND

Conventional sanitary towels and panty liners, and incontinence pads in the same order of magnitude, are provided with fastening means for holding the article in place in the undergarments of the user.

15

A known problem is that undergarments are stretched and can also be locally displaced under the movements which occur in the use of the undergarment and that the sanitary towel is in this case dragged along by the garment and displaced from its position directly in front of the genitalia of the user. This is a common cause of leakage of body fluid from sanitary towels in the lateral direction.

20

Sanitary towels of conventional type are not stretchable or elastic and, apart from being unable to imitate the movements of the undergarment, nor are they flexible with the body and can be felt to be stiff and uncomfortable for the user.

25

Undergarments are felt by the majority of users to be comfortable and flexible. It has been proposed to design sanitary towels such that they are stretchable and, suitably, also elastic, so that they can imitate the movements of the user and the undergarment and remain in the intended position.

30

In US 5,713,884, for example, sanitary towels are described which are stretchable and, preferably, also elastic.

35

The stretchability of the sanitary towel should suitably correspond to the stretchability or elasticity of the undergarment. It has been shown that ca. 20% stretchability is sufficient for undergarments to allow them to imitate body movements made by a user. This is also discussed in US 5,713,884.

5

In the said publication it is stated that, suitably, all materials included in the sanitary towel shall be stretchable and preferably also elastic. Yet an illustrative embodiment is also mentioned in passing, in which the included absorbent material is not stretchable, though it is stated, at the same time, that this embodiment is not preferred.

10

It is possible to produce a sanitary towel which, owing to its elasticity, can adapt to the movements which occur in the undergarments of the user.

15 On the other hand, it is difficult to find elastic materials which have sufficient absorbency and liquid holding capacity and other properties demanded of present-day absorption materials. It is, however, easier to find inner layers and outer layers which are elastic and which, at the same time, can manage their respective functions, such as permeability and dryness for the inner layer and liquid-tightness for the outer layer.

20

By dropping the requirement that the absorption core should also be elastic, there is no need to seek special absorption materials which are elastic and which, at the same time, can meet the tough capacity requirements which are placed on absorption materials in present-day sanitary towels. It is instead possible to make an arbitrary choice from all available absorption materials.

25

A problem which has not hitherto received attention is the risk that a non-elastic absorption core might easily end up in the wrong position when exposed to forces arising from the elastic outer layers when these are elongated and fastened in the undergarment of the user. When forces are applied and the outer layers of the product (sanitary towel) are lengthened as the towel is positioned, it is very important for the user to know where the absorption body is placed in the product (sanitary towel). In other words, it is important to ensure that the absorption body of the towel ends up directly in front of the genitalia of the user.

30

35

## DESCRIPTION OF THE INVENTION

5 As a result of the present invention, an elastic absorbent article of the type described in the introduction has been achieved, which article essentially eliminates the problems described above.

10 An absorbent article according to the invention is characterized in that the inner layer and the outer layer are elastic and in that the intermediate absorption body is non-elastic, in that the inner layer and the outer layer extend beyond the absorption body in the lateral and longitudinal directions and are mutually joined there, in that the absorption body is connected to at least one of the said inner and outer layers only in a central and tiny region and in that the said region is visibly marked on the liquid-permeable layer.

15 Owing to the visible marking, the central part of the sanitary towel, and hence the absorption body, can be optimally placed in the undergarment so that the said central region ends up directly in front of the genitalia of the user.

20 Expediently, the marking is constituted by a colour marking or pattern stamp. Other types of markings are naturally possible. The essential point is that the marking is easily visible.

25 The said fastening means is constituted by bonding agent coatings applied at separate locations on the liquid-impermeable layer. This is important in order for the inner and outer layers of the sanitary towel to be elastically stretchable over intermediate regions which have no coating of bonding agent. Expediently, bonding agent coatings are applied in the four corner regions of the article.

30 As stated above, it is essential that the central, marked region of the sanitary towel ends up in the correct position.

35 According to a suitable embodiment of the invention, one region of the bonding agent coating is therefore also applied directly in front of the marking.

According to a further embodiment of the invention, wings are arranged to extend beyond the outer and inner layers in the lateral direction, which wings are provided with fastening means and are intended to be folded around the edge of the crotch section of the undergarment and fastened to the outside thereof when the sanitary towel is positioned.

The shape of the absorption body can be varied within the scope of the invention.

One way of reducing the risk of edge leakage caused by deformation of the product during use is to provide the product with a pre-formed, anatomically matched elevation, which is intended to be placed against the genitalia of the user when the product is positioned. The intention is also, of course, that the product, with its elevation, will remain in the applied position during use. This is facilitated if the elevation or hump, which is the usual designation in professional circles, is designed such that it is rigid under normal usage stresses. According to a suitable embodiment, the product according to the invention is therefore characterized in that the absorbent body is convex in the direction of the liquid-permeable inner layer which is facing the user during use of the product and in that the marking is applied to the inner layer substantially on the top of the convex surface formed.

If the absorbent body is relatively rigid in comparison to the inner and the outer layer, the absorption body, since it is fastened to the inner and/or the outer layer only in a central region, will otherwise "float freely" between the inner and outer layers. In embodiments in which the absorption body has an extent such that it is relatively wide and approaches in the lateral direction the bound-together outer edges of the inner and outer layers, the absorption body is suitably rounded in the corners in order to prevent the free corner sections of the absorption body from catching in the bound-together edge sections of the inner and outer layers.

#### BRIEF DESCRIPTION OF THE FIGURES

The invention will be described in greater detail below with reference to illustrative embodiments shown in the appended drawings, in which:

- Figure 1 shows a sanitary towel according to a first embodiment, viewed from the side which is intended to be facing the user when the sanitary towel is in use,
- 5
- Figure 2 shows a cross section along the line II-II in Figure 1,
- Figure 3 shows the sanitary towel according to Figure 1, viewed from the side which is facing away from the user when the towel is in use,
- 10
- Figure 4 shows a sanitary towel according to a second embodiment, viewed from the side which is intended to be facing the user when the sanitary towel is in use,
- 15
- Figure 5 shows a cross section along the line V-V in Figure 4,
- Figure 6 shows the sanitary towel according to Figure 4, viewed from the side which is facing away from the user when the towel is in use,
- 20
- Figure 7 shows a sanitary towel according to a third embodiment, viewed from the side which is facing away from the user when the towel is in use,
- 25
- Figure 8 shows a sanitary towel according to a fourth embodiment, viewed from the side which is facing the user when the towel is in use,
- 30
- Figure 9 shows a cross section along the line IX-IX in Figure 8,
- Figure 10 shows a cross section along the line X-X in Figure 8, and
- Figure 11 shows a sanitary towel according to Figure 8, viewed from the side which is facing away from the user when the towel is in use,
- 35

Figure 12 shows a sanitary towel according to a fifth embodiment, viewed from the side which is facing the user during use,

Figure 13 shows a cross section along the line XIII-XIII in Figure 12.

5

## DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

The sanitary towel shown in Figures 1-3 has an inner layer 1 of liquid-permeable material and an outer layer of liquid-impermeable material. The  
10 outer layer and the inner layer are formed from elastic material. By elastic materials is here meant materials which can stretch in the order of magnitude of at least 20%, under normally occurring stresses and which revert substantially to their original length once the load is relieved.

15 Between the inner layer 1 and the outer layer 2, a non-elastic absorbent body 3 is placed. By non-elastic is here meant that the absorbent body does not stretch at least not elastically under loads which normally occur when the sanitary towel is used. The inner and outer layers extend beyond the absorbent body 3 in the lateral and longitudinal directions and are mutually  
20 joined there along an edge section 4.

The outer layer 2 is intended to be fastened to the inside of the undergarment (not shown) of the user by means of bonding agent coatings 5, one at each corner, as can be seen from Figure 3. A bonding agent coating 6 is arranged  
25 in the centre of the liquid-tight outer layer. The said bonding agent coatings are suitably constituted by pressure-sensitive hot-melt adhesive, as it is known. Once the towel is fixed in the undergarment, the inner and outer layers will be stretched and elastically carried along by the undergarment as it moves, which movements, in turn, imitate the body movements of the user.

30

In the region directly in front of the bonding agent coating 6, the absorbent body 3 is connected to the inside of the liquid-impermeable outer layer 2 by means of a central bonding agent coating 7 of essentially the same extent as the bonding agent coating 6 on the outside of the outer layer.



On the inside of the liquid-permeable layer 1 there is arranged a marking 8, which is visible as the product is positioned and, in connection herewith, is intended to be placed directly in front of the genitalia of the user.

- 5 When a user wearing a sanitary towel of the type described in Figures 1-3, fitted in an undergarment, moves, the inner and outer layers of the sanitary towel are carried along by the undergarment whenever this is stretched or locally displaced, as has been mentioned above. In the region directly in front of and around the genitalia of the user, the undergarments of the user are
- 10 essentially unaffected under normal body movements. Since the non-elastic absorbent body 3 is connected to the outer layer 2 by means of the bonding agent coating 7 only in a central region, the absorbent body will be essentially unaffected by tensile stresses arising in the elastic inner and outer layers 1 and 2 respectively. This relationship is exploited in the product
- 15 according to the invention by virtue of the fact that the absorbent body is placed optimally directly in front of the genitalia of the user when the towel is positioned, using the visible marking 8. As has been described above, this is situated, directly in front of the central bonding agent coating 7, which constitutes the sole anchorage of the absorbent body in the outer layer 2.
- 20 The absorbent body 3 will therefore remain in optimal position throughout the use of the towel, essentially regardless of the movements of the user.

The wet point of the sanitary towel, as it is known, will therefore coincide with, alternatively be enclosed by, the marking 8 on the inner layer.

- 25 The bonding agent coating 6, which is applied to the outside of the liquid-impermeable layer 2, is placed directly in front of the bonding agent coating 7, which, in turn, is situated directly in front of the marking 8 on the liquid-permeable layer 1.

- 30 When a user places the sanitary towel with the marking 8 directly in front of her genitalia, the connection, the bonding agent coating 7, thus ends up between the absorbent body 3 and the casing of the sanitary towel directly in front of the genitalia of the user. The bonding agent coating 6 is fastened to
- 35 the inside of the crotch section of an undergarment in a region of the undergarment which is not affected by movements of the user. The bonding

agent coatings 5 in the four corners of the sanitary towel are fastened to an undergarment in regions thereof which can be carried along when the user moves.

- 5 Undergarments are made from materials which are flexible and comfortable for the user. The casing of the sanitary towel, which is formed by the inner layer 1 and the outer layer 2, is formed from elastic materials of such elasticity that the casing imitates the movements of the undergarment under the forces which normally occur whilst the undergarment and the sanitary  
10 towel are in use. The adhesion between the adhesive coatings 5 and the undergarment of the user is sufficient for the sanitary towel not to come loose from the undergarment but to be carried along with its movements.

- 15 The advantage of an elastic towel is that the towel is able to stretch instead of being pulled out of its optimal usage position, i.e. a position in which the absorbent body is situated directly in front of the genitalia of the user.

- 20 Since the marking 8 on the sanitary towel is placed in the undergarment such that the marking is situated directly in front of the genitalia of the user when the sanitary towel is in use, i.e. in a region of the undergarment which is essentially unaffected by movements of the user, the absorbent body, which is secured in the casing directly in front of the marking 8 by means of the bonding agent coating, will remain in optimal position directly in front of the genitalia of the user whilst the sanitary towel is used.

- 25 The fact that the casing of the sanitary towel can be elastically carried along by the undergarment, under movements of the user, without any effect upon the sanitary towel in the region directly in front of the marking means that the absorbent body 3 will remain in optimal position throughout the use of the  
30 sanitary towel.

- 35 In the case of conventional, non-elastic sanitary towels, the absorbent body is carried along whenever the undergarment imitates movements of the body and there is a risk of possible leakage resulting from the absorbent body of the sanitary towel ending up at an oblique angle in relation to the genitalia of the user.

When the casing is elastic and the absorbent body is non-elastic, it is important for the absorbent body to be placed in the correct position when the sanitary towel is positioned.

- 5 If a sanitary towel of the type which is shown in Figures 1-3 is wrongly positioned so that the region of the bonding agent coating 7 ends up directly in front of a region on the undergarment which can be displaced under movements of the user, there is a risk of the absorbent body being pulled further from its optimal position, giving rise to an obvious risk of leakage.

10

The securement of the non-elastic absorbent body in a tiny, delimited region by means of the bonding agent coating 7 is essential. If the absorption body were to be connected to the elastic casing by means of a fastening line extending along the length of the absorbent body, as is described in US  
15 patent 4,534,769, the absorbent body would be acted on by tensile stresses arising in the undergarment and there would be a high risk of the absorbent body of the sanitary towel being pulled out of its optimal position directly in front of the genitalia of the user, with an attendant risk of leakage.

- 20 In the design according to Figures 1-3, the absorbent body can "float freely" within the casing over the main part of its surface and is only secured in a region which is intended to be placed directly in front of the genitalia of the user whilst the sanitary towel is used, i.e. in a region in which the undergarment is not displaced.

25

A suitable elastic inner layer 1 can be formed from a plurality of different materials including, but not limited to, fibre (non-woven) fabrics, perforated plastic films, porous foam and plastic gauze.

- 30 Suitable fibre fabrics can consist of one type of fibres or a combination of fibres, such as fibres of polyester, polypropylene, polyethylene, nylon and rayon.

- 35 An inner layer 1 in the form of perforated plastic film offering reduced re-wetting is known from a large number of patents. An early example of perforated plastic films is described in US 3,929,135.

The elasticity in a plastic film is determined by a choice of plastic material and/or by controlling the elasticity in a plastic film by means of the configuration of the perforation. The inner layer can obviously consist of a multi-layered laminate, at least one layer of which is elastic.

5

The outer layer 3 is liquid-impermeable and can be constituted, for example, by a polyethylene plastic film having suitable elastic properties. The outer layer should have a stretchability of more than 20% under the loads which normally occur on a sanitary towel secured in an undergarment. The outer layer can also be formed from an elastic, hydrophobic non-woven fabric. The outer layer can also be constituted by a laminate, such as a very thin plastic film, in combination with an elastic non-woven fabric.

10

The choice of material in the inner layer and outer layer is not critical. The essential point is that the inner layer is liquid-permeable and the outer layer is liquid-impermeable and that the two layers are elastically stretchable so that they are flexible to conventional undergarments.

15

The fact that the absorption body in the sanitary towel is able to be non-elastic has the fundamental advantage that it is possible to make an arbitrary choice of absorption body from absorption bodies available on the market, without any compromises for them having to be elastic.

20

A suitable absorbent material for the absorption body 6 in Figures 1-3 is the material described in WO 94/10956. This material is constituted by a dry-formed, fibre layer with a high density and is used directly in an absorbent article without it first being defibrated. Another similar material, which has especially suitable blood-absorption properties, is described in WO 94/10953. The materials described in the two latter publications are relatively stiff and have good capacity to withstand pressure deformations. The material can be softened by mechanical treatment. The materials described in the latter publications have good absorbency. The materials swell in the direction of thickness during absorption and are thereby able to adapt to space available in the crotch of the user.

25

30

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The choice of material is not critical. Another example of a suitable absorption material is cellulose fluff material, possibly with the admixture of a highly-absorbent polymer in powder or fibre form.

- 5 The marking 8 can be constituted by a colour marking. Another example is that the marking having been formed by relief printing. The inner layer 1 can be connected to the absorbent body in the region delimited by the marking and the visible marking can in this case be constituted by a bonding agent coating which is visible through the inner layer 1.

10

According to another suitable illustrative embodiment, the marking is constituted by a number of visible holes, which, apart from serving as a marking, can be formed to make it easier for liquid to pass into the absorbent body.

15

In the embodiment according to Figures 4-6, the details which essentially conform in every respect to corresponding details in the embodiment according to Figures 1-3 have been provided with the same reference notations.

20

In the embodiment according to Figures 4-6, the absorbent body consists of a main absorbent body 3, similar to the absorbent body 3 in the embodiment according to Figures 1-3, and a substantially hourglass-shaped absorbent layer 3'. This is situated next to the user inside the inner layer 1 and is of softer configuration than the underlying main absorbent body 3.

25

The hourglass-shaped absorbent layer 3' serves as an insulating layer between the liquid-permeable inner layer 1 and the main absorbent body 3 and has the capacity to rapidly admit liquid to the main absorbent body, which has higher liquid affinity than the hourglass-shaped absorption layer 3'. This can suitably be formed from a low-density, air-laid fibre layer.

30

The marking 8, which is intended to show where the towel is to be placed, here has the shape of two annular segments, which are arranged on both sides of the wet point of the sanitary towel, as it is known, i.e. the region which is intended to be situated directly in front of the genitalia of the user

35

whilst the sanitary towel is used. These annular segments can be made visible in a similar manner to the marking 8 which has been described above in connection with Figures 1-3.

- 5 Since the marking 8 in the embodiment according to Figures 4-6 is not situated over the wet point, this marking does not need to be liquid-permeable, which increases the options for the configuration of the marking. The marking 8 in Figure 4 can be constituted, for example, by a bonding agent on the outside of the inner layer 1, which bonding agent, apart from  
10 constituting a marking for the positioning of the sanitary towel, serves as fastening means against the skin of the user in a region around the genitalia of the user.

- The bonding agent coatings 5 in the corners of the sanitary towel are  
15 somewhat elongated and have here been applied at an oblique angle in order better to absorb tensile stresses from the undergarment of the user.

- The embodiment according to Figure 7 differs from the embodiment according to Figure 3 only by the fact that the sanitary towel according to  
20 Figure 7 has been provided with wings 9, on which bonding agent coatings 10 are arranged. When the sanitary towel according to Figure 7 is positioned, the wings are folded around the edge section in the crotch section of the undergarment and the bonding agent coatings 10 are fastened to the outside of the undergarment in the crotch region.

- 25 In the embodiment shown in Figures 8-11, the details which essentially conform to corresponding details in other illustrative embodiments have been provided with the same reference notations.

- 30 The sanitary towel according to Figures 8-11 is anatomically configured with a narrower crotch section and with an absorbent body 3, which, in the crotch region, has a bulge 3" which is convex in the direction of the liquid-permeable layer. This convex bulge 3" is designated in professional circles as a hump.

- 35 The absorbent body in the embodiment according to Figures 8-11 consists of an elongated part 3 and the hump 3". The extent of the latter in the

transverse and longitudinal directions can be seen from Figures 9 and 10. The marking 8 is applied on the top of the hump 3".

5 The marking 8 is intended to end up directly in front of the genitalia of the user when the sanitary towel is positioned. The hump is formed in a material which is not essentially deformed when the towel is squeezed in the crotch of the user, but rather the elevation, the hump, of the sanitary towel will bear against the genitalia of the user, so that secreted body fluid is captured as soon as it leaves the body of the user and is absorbed into the sanitary towel  
10 instead of running out over its surface.

The hump 3" can be constituted, for example, by a dry-formed fibre layer of the type which is described in WO 94/10956 and which has also been described above in connection with the embodiment according to Figures 1-  
15 3. The elongated absorption body 3 can also be formed from a dry-formed fibre layer of the above-stated type.

In Figures 12 and 13, an embodiment which is somewhat modified in relation to the embodiment according to Figures 1-3 is shown. The details which  
20 conform to corresponding details in the embodiment according to Figures 1-3 have been provided with the same reference notations.

The embodiment according to Figures 12 and 13 differs primarily from the embodiment according to Figures 1-3 by the fact that the absorption body 3  
25 is wider and that the corners 11 of the absorption body are rounded. The corners are rounded in order to prevent these "free-floating" corners from catching against the edge seal 4 inside the casing of the sanitary towel when the user moves and the casing is carried along with the movement of the undergarment.

30 In the illustrative embodiment shown in Figures 12-13, the marking 8 is constituted by a patterned decoration.

The invention is not limited to the above-stated described illustrative  
35 embodiments, but rather a plurality of modifications are possible within the scope of the following patent claims.

It has been mentioned above that the liquid-permeable inner layer can be connected with the absorbent core. Such a connection can, dependent on the material in the inner layer and absorbent body, be suitable in order to

5 create contact between the inner layer and the absorbent body and facilitate for liquid to pass from the inner layer to the absorbent body. When such a connection between the inner layer and the absorbent body exist it is arranged in or around the central, marked region. The connection between

10 inner layer and absorbent core is of course arranged so that it does not block and thereby disturb the inflow of body-liquid from the inner layer to the absorbent core.



## PATENT CLAIMS

1. An elastic absorbent article such as a sanitary towel, a panty  
5 liner or an incontinence pad, intended to be placed in the crotch region of an  
undergarment, which article has a longitudinal direction and a transverse  
direction and comprises a liquid-permeable inner layer (1) and a liquid-  
impermeable outer layer (2) and an absorbent body (3) enclosed between  
the said layers, in addition to which the article incorporates fastening means  
10 (5, 6) for holding the article in the undergarment, characterized in that the  
inner layer (1) and the outer layer (2) are elastic and in that the intermediate  
absorbent body (3) is non-elastic, in that the inner layer (1) and the outer  
layer (2) extend beyond the absorbent body (3) in the lateral and longitudinal  
directions and are mutually joined there, in that the absorbent body (3) is  
15 connected to at least one of the said inner and outer layers only in a central  
and tiny region and in that the said region is visibly marked on the liquid-  
permeable inner layer (1).
2. Article according to Claim 1, characterized in that the marking (8)  
20 is constituted by a colour marking or pattern stamp.
3. Article according to Claim 1 or 2, characterized in that the said  
fastening means (5, 6) is constituted by bonding agent coatings applied at  
separate locations on the liquid-impermeable layer.  
25
4. Article according to Claim 3, characterized in that bonding agent  
coatings (5) are applied in the four corner regions of the article.
5. Article according to Claim 4, characterized in that one region (6)  
30 of the bonding agent coating is also applied directly in front of the marking  
(8).
6. Article according to any of the preceding claims, characterized in  
that wings (9) are arranged to extend beyond the outer (2) and inner layers  
35 (1) in the lateral direction, which wings are provided with fastening means  
(10) and are intended to be folded around the edge of the crotch section of

the undergarment and fastened to the outside thereof when the sanitary towel is positioned.

7. Article according to any of the preceding claims, characterized in that the absorbent body (3) is convex in the direction of the liquid-permeable inner layer which is facing the user during use of the product and in that the marking (8) is applied to the inner layer (1) substantially on the top of the convex surface formed.
8. Article according to any of the preceding claims, characterized in that the absorbent body (3) is rounded in the corners (11) in order to prevent the free corner sections of the absorbent body from catching in the bound-together edge sections (4) of the inner (1) and outer layers (2).
9. Article according to any of the preceding claims, characterized in that the marking (8) is arranged intermittently or continuously over a region which is intended to wholly or partially surround but not span the genitalia of the user whilst the article is used.
10. Article according to Claim 9, characterized in that the said marking (8) is constituted by a weave-friendly bonding agent, which is friendly to body-tissue.

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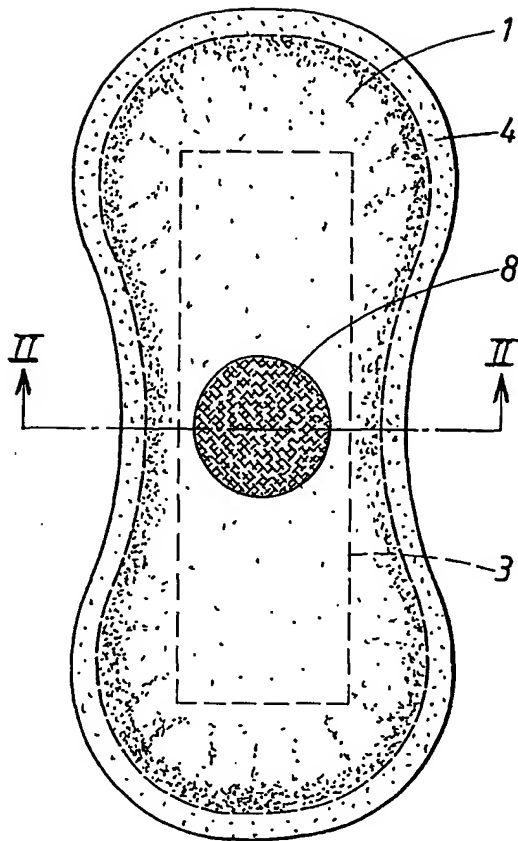


FIG. 1

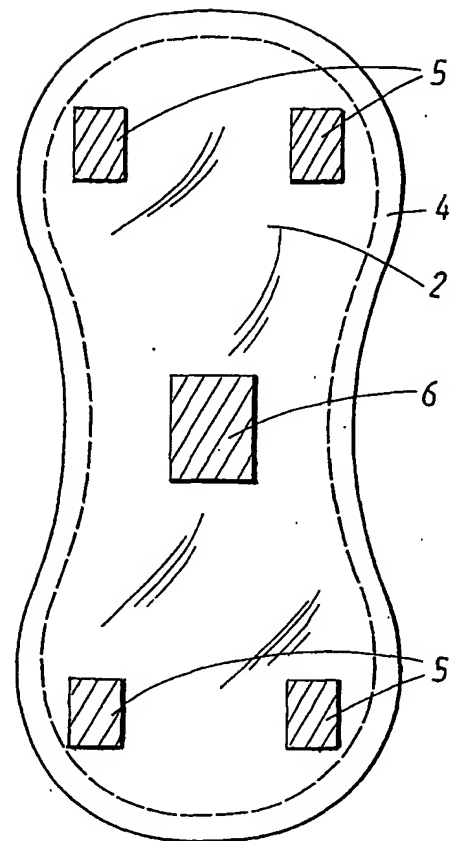


FIG. 3

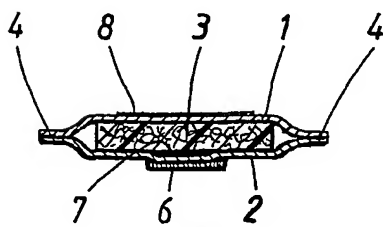


FIG. 2

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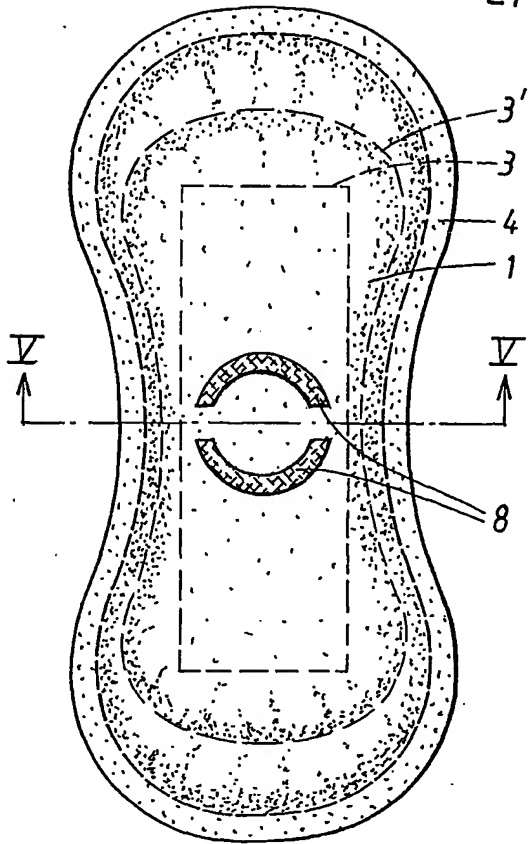


FIG. 4

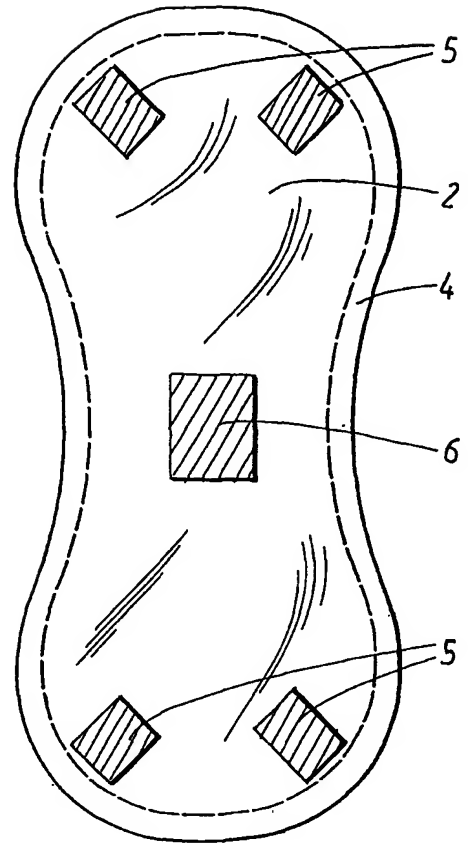


FIG. 6

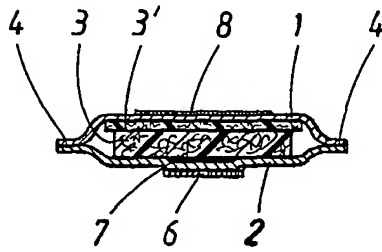


FIG. 5

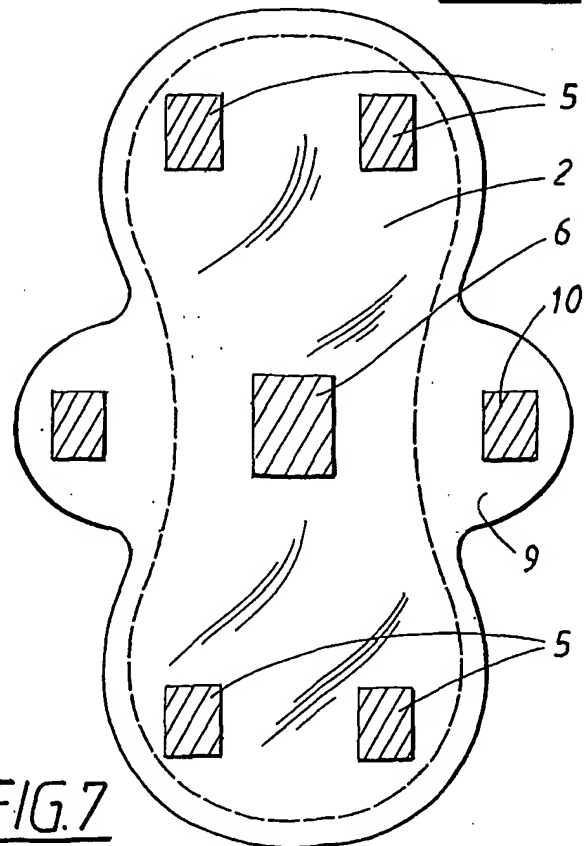


FIG. 7

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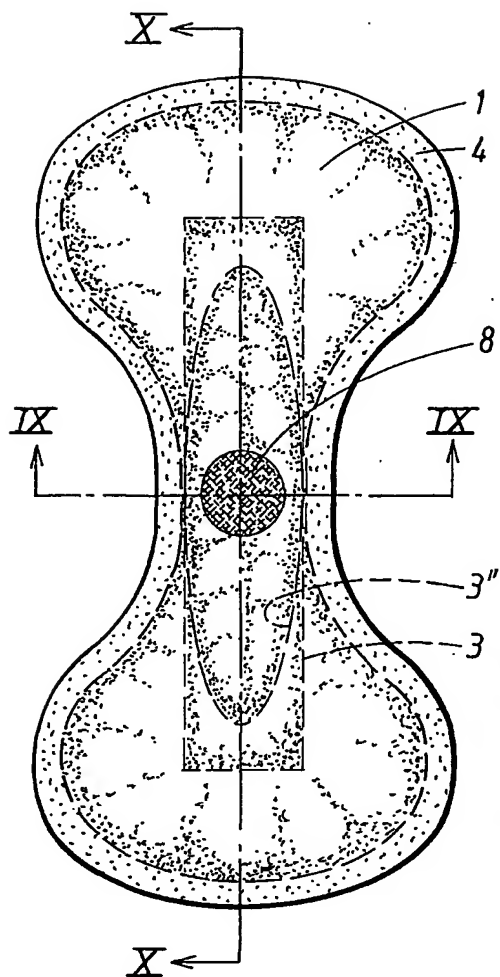


FIG. 8

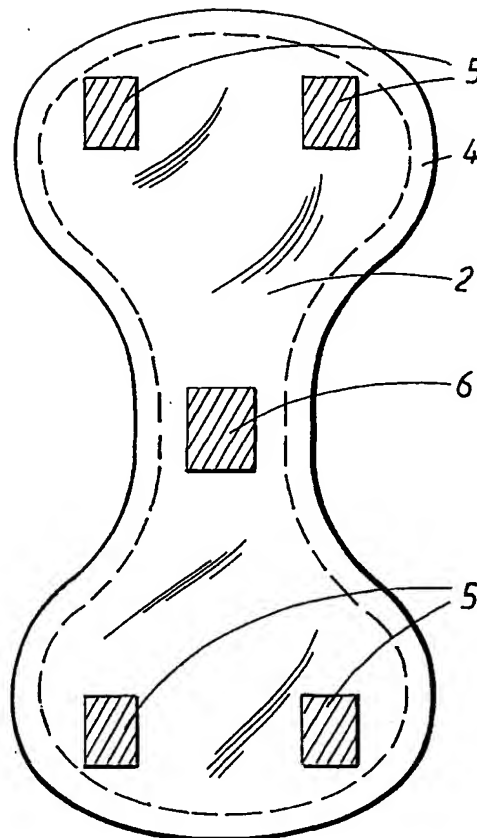


FIG. 11

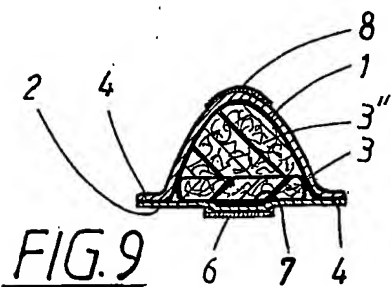


FIG. 9

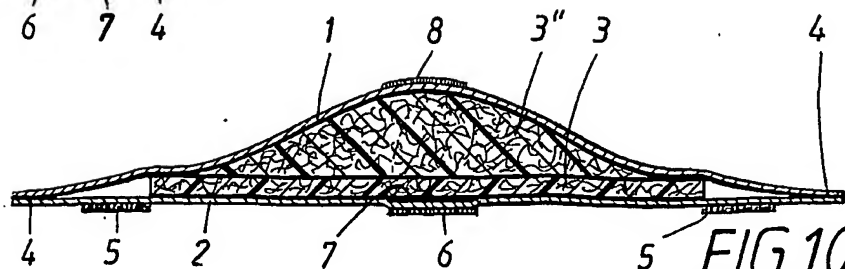


FIG. 10

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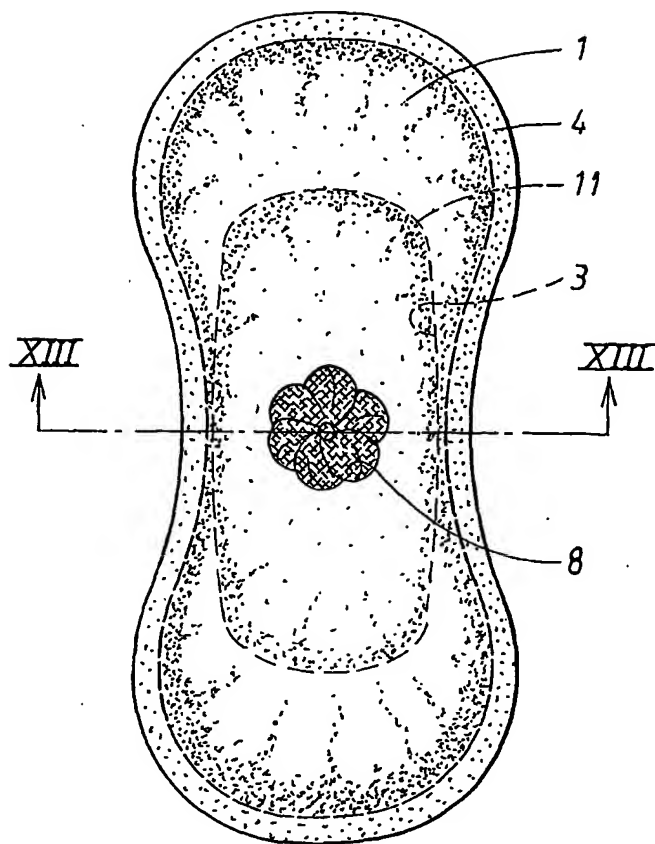


FIG. 12

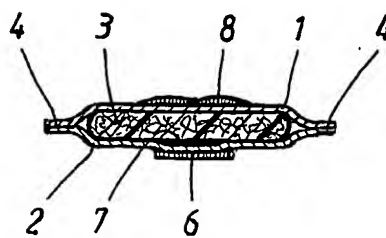


FIG. 13

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 01/02228

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: A61F 13/51

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, EPODOC

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Y	US 6129720 A (TIMOTHY JAMES BLENKE ET AL), 10 October 2000 (10.10.00), column 1, line 23 - column 2, line 49, especially column 2, line 11 - line 24 --	1-10
A	US 5658269 A (THOMAS W. OSBORN, III ET AL), 19 August 1997 (19.08.97), column 2, line 56 - line 61 --	1-10

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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"&amp;" document member of the same patent family

Date of the actual completion of the international search

21 February 2002

Date of mailing of the international search report

22-02-2002

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